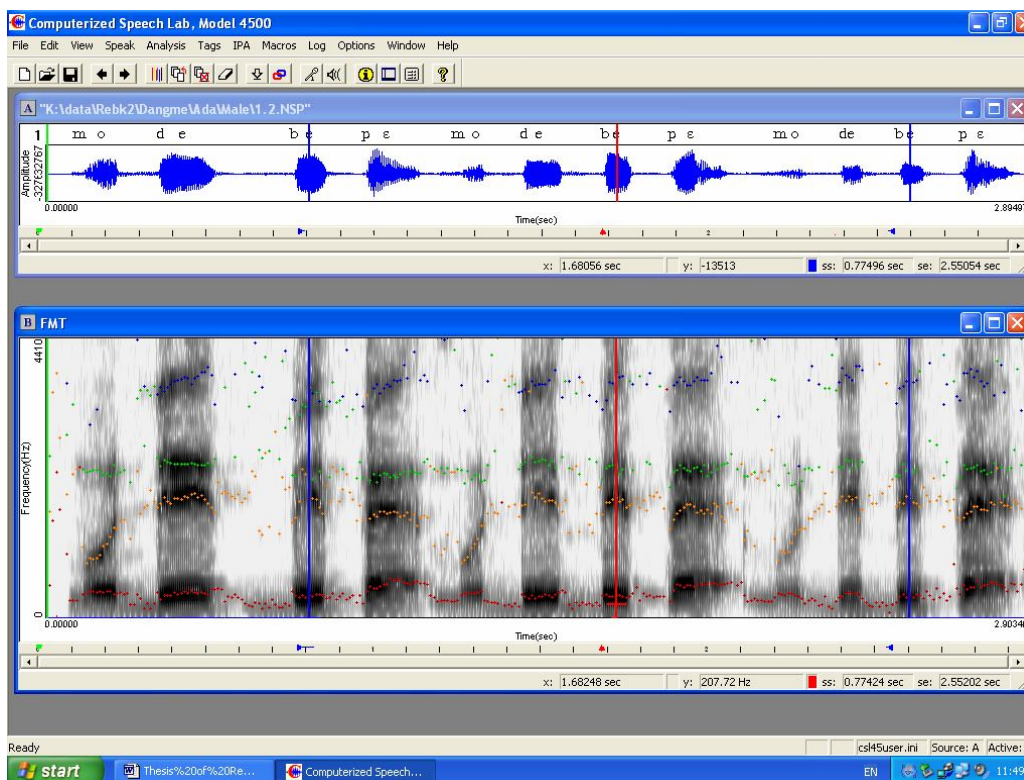# PAPERS IN APPLIED LINGUISTICS

Vol. 1

Waveform and spectrogram of a male speaker of Dangme from Ada dialectal area repeating "Mode be pɛ" three times. The points in time at which the formant values were measured are indicated on the spectrograms with vertical lines.

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APPLICATION OF PHONETICS IN LANGUAGE EDUCATION IN GHANA

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0.   INTRODUCTION

A common theme that runs through all of Peter Ladefoged's research and, to a large extent, those of his students is that a phonology must not only account for the phonological facts of a language, but must also account for the linguistic phonetic facts, which include phonetic differences between languages. He noted that "— if there is a noticeable difference between two sounds in different languages, such that either of them would sound foreign if it were used in the other language, then this difference is part of the linguistic facts of each language," (Ladefoged, 1980: 499). It is my conviction that phoneticians are obliged to account for any such differences.

Chomsky and Halle, as well as their students and followers, seem satisfied to relegate most phonetic differences between languages to "low-level phonetic rules that assign numerical values to the features." For instance, commenting on the perceived differences between the retroflex sounds of West African languages such as Ewe and those found in Indian languages such as Hindi, Chomsky and Halle (1968) insist that the "existence of a systematic phonetic differences does not, therefore, in itself constitute a necessary and sufficient condition for postulating an additional point of articulation."

Nartey (1982), commenting on the position taken by Chomsky and Halle, stressed that "if indeed we do find a third language that uses the systematic difference between, say, Hindi and Ewe retroflex stops as a distinctive feature, our phonological theory would not be adequately prepared to handle this language," (p. 5). Using the production of /r/ by speakers of American English, Nartey argued that "the relationship between articulatory and acoustic/auditory parameters is not straightforward." He argued further that a phonological theory that did not recognize the distinction between articulatory and acoustic/auditory criteria for features was bound to have serious problems when it came to application.

1.0 REPRESENTATION OF SOUNDS IN GHANAIAN LANGUAGES

Even though some effort has been made to describe the speech sounds of the indigenous languages of Ghana, no real attempt has been made to examine the acoustic/auditory

properties of these sounds. In the majority of cases, vowel charts of various Ghanaian languages are plotted based on vowel qualities of English by people without adequate phonetic training. In fact, phonetic studies of Ghanaian languages involving acoustic measures can be counted on the fingers of one hand. The result is that most Ghanaians assume that sounds in their languages represented by symbols used for English transcription, for instance, are the "same" as the equivalent English sounds. This assumption poses a number of problems to both language teachers and learners alike, because differences do exist between the sounds of English and the various Ghanaian languages. In some cases, the differences are so striking that most native speakers of English visiting Ghana need quite some time to adjust to this the Ghanaian variety

A casual listener of the variety of English spoken in Ghana, for instance, notices that there are a number of differences in the vowel sounds being used even between Ghanaians from different language backgrounds. The impression of the trained ear is that a number of vowels are conflagrated – especially in the high and low thirds of the English vowel chart. Thus [i] and [ɪ] both surface as [i] while [u] and [ʊ] surface as [u] and [æ], [a] and [ɒ] all come out as [a]. It is my conviction that phoneticians are obliged to account for these differences.

The auditory evidence cited here prompted the acoustic investigations into the Ghanaian languages reported in the following sections.

1.1 REPRESENTATION OF SOUNDS IN AKAN (TWI AND FANTE)

Akan is the single most popular of the indigenous languages of Ghana, being spoken by slightly more than 45% of the population. It is the main language of the Ashanti, Brong Ahafo, Central, and Eastern Regions of the country.

1.1.1 How Many Are the Vowels of Akan?

Ladefoged (1964) suggests that there are ten vowel sounds in Twi but only nine in Fante. This position is supported by the Akan linguist Dolphyne (1988). These vowels are represented by the following symbols: [i, ɪ, e, ɛ, æ, a, ɔ, o, ʊ, u]. It is claimed by both linguists that Fante has only one low vowel [a] compared to two [æ, a] in Twi. Preliminary acoustic studies carried out in the University of Education, Winneba (UEW) Phonetics Lab, however, seems to suggest that there may be only eight distinct vowel sounds in Akan. For one thing, there seems to be no difference between the vowels represented in the literature by [ɪ] and [e], nor is there a phonetic distinction between [o] and [ʊ]. Interestingly, the data from the UEW Phonetics Lab indicated that contrary to Ladefoged's findings, it is Fante that has the larger inventory of phonetic vowels, featuring both low vowels [æ, a] in question, while Twi features only [a]. This seeming discrepancy in the representations of the two established linguists has prompted a more systematic spectrographic study of Akan. (See Lomotey, next volume of this publication.)

1.2 REPRESENTATION OF SOUNDS IN EWE

The second most popular indigenous Ghanaian language is Ewe with approximately 20% of the country's population using it. Ewe is the main language of the Volta Region of Ghana. There are three distinct dialects of the Ewe spoken in Ghana. These are the Anglo (on the coast), Tongu (in the middle), and Vedome (in the northern part of Eweland).

1.2.1 The Non-Back Mid Vowels of Ewe

Ewe is said to have an eight-vowel system [i, e, ɛ, ə, a, ɔ, o, u] all of which may appear oral or nasalized. But a systematic acoustic investigation indicates that of the three main dialect areas of Ewe, namely, coastal Ewe (Anglo/Avenor), Vedome (Ho/Kpando), and Tongu (Battor/Sogakorpe), only the Tongu dialect makes all eight vowel quality distinctions in their pronunciation (Gbegble, this volume). Even so, there seems to be a slight interdependence between the two mid front vowels [e, ɛ]. As it turns out among the Vedome (Northern Ewe) group, there is no significant difference between [e] and [ɛ] though these two are very distinct from the schwa [ə]. In other words, this dialect distinguishes a mid front vowel and a mid central vowel. For the coastal dialect, [ɛ] is a distinct sound while [e] and [ə] seem to be one and the same sound. The situation here is not that simple in the sense that the two mid front vowel symbols seem to have been exchanged one for the other. Hence, [ɛ] is placed higher on the chart than [e]. (See Gbegble, this volume.)

The problem is that we cannot be sure what caused this. Target vowels were embedded in carrier frames that were read from cue cards. It is possible the orthography was misinterpreted or that there is a real sound change in progress. Further study is needed to show which the case is. The important thing is that a teacher of Ewe must know these phonetic facts in order to be effective in the Ewe classroom.

1.2.2 Tone in Ewe

Depending on the researcher, Ewe is said to have two level tones and two contour tones or as many as eleven phonetic tone types. In the absence of instrumental evidence, the Ewe tone situation can best be described as a mess. Capo (1991) summarizes the Ewe tone situation as, five level tones and six contour tones, namely;

Level Tones	Contour Tones
Extra High	H-L falling
High	H-M falling
Mid	M-L falling
Low	M-H rising
Extra Low	L-H rising
	L-M rising

Clearly, the only way the Ewe situation could be settled once and for all is by means of systematic acoustic analysis. (See Gonuh, next Volume.)

1.3 REPRESENTATION OF SOUNDS IN GADANGME

Data available from the 1960 and 1970 population censuses list Dangme and Ga respectively as the number three and four indigenous languages spoken in Ghana. A number of linguists, including the present author, regard the two "languages" as dialects of the same language. This stand is backed by application of the Swadesh list which yields a very high correspondence between the two 'languages/dialects. In fact, in the past twenty years or so, scholars of the language group have adopted the name GaDangme to describe both the language and the ethnic group.

1.3.1 The Oral and the Nasalized Vowels of GaDangme
A systematic acoustic investigation of the vowels of GaDangme, a western Kwa language group spoken in the Greater Accra Region and the southeastern part of the Eastern Region of Ghana, indicates that the language group clearly distinguishes seven oral vowels [i, e, ɛ, a, ɔ, o, u] and five nasalized vowels [ĩ, ɛ̃, ã, ɔ̃, ũ] (See Doku, this volume). Results of this investigation show that the nasalized vowels, with the exception of the low vowel (which incidentally turned out to be [ɑ] rather than [a]), are higher on the vowel chart than their oral cognates. This is contrary to previous studies that presented the nasalized vowels as being higher than their oral cognates,

1.3.2 Tone in GaDangme
The GaDangme language also has three phonemically distinct level tones (in addition to which Ga has one contour tone). Hence, the following monosyllables are distinct words of the Dangme language: bá "come"   bā   "has come"   bà   "leaf / lend". (High Tone is marked by [´], Mid Tone by [¯], and Low Tone by [`]). This phenomenon is further illustrated in Table 1.

Table 1. Tone in Dangme.

High Tone	há	"knife"	hã	"give"
Mid Tone	hā	_	hã	"charcoal"
Low Tone	hà	"(to) clothe"	hã	_
and				
High Tone	pá	"sore"	pã	"leak / (to) lance"
Mid Tone	pā	- -	pã	- -
Low Tone	pà	"river / borrow"	pã	"widen"
or				
High Tone	fi	- -	fĩ	"hard up"
Mid Tone	fi	- -	fĩ	"tie"
Low Tone	fi	- -	fĩ	"excreta/faeces"

But the orthography of the language recognizes only seven vowel symbols, namely, "i, e, ɛ, a, ɔ, o, u." It follows that with the exception of [e] and [o] which have no nasalized cognates, each GaDangme vowel symbol is a short hand for six distinctive speech sounds of the language. Mercifully, (for the Dangme school child) it is rare to have all six possibilities in monosyllabic words. In fact, four is the norm as exemplified in table 1. Even so, it is quite a load of cognitive responsibility for a school child to deal with. In pedagogical terminology, this is a cognitive overload, plain and simple.

1.4 REPRESENTATION OF SOUNDS IN DAGBANI

In both the 1960 and 1970 population censuses, Dagbani is listed as the number five indigenous language (after Akan, Ewe, and Dangme and Ga). Data from the 2000 census seems to suggest that the number of Dagbani speakers has increased substantially, nearly equaling that of Dangme.

1.4.1 The Issue of the Dagbani Vowel Numbers

Various Dagbani scholars have proposed the number of vowels in the language as nine, ten and even eleven short versus five long vowels. An acoustic investigation into the Dagbani vowels yielded rather interesting results. It was revealed that of the three major dialects of Dagbani, one makes eight vowel quality distinctions while the other two make only seven distinctions. (See Fusheini, this volume). As it turns out, there is only one high front vowel and not the two purported to exist in the language. This is true for all three dialects. In the back, however, one dialect, namely, Nanuni, makes a clear distinction between a "tense" high back and a "lax" high back vowel. The other two dialects (Tomosili and Nayahili) do not make this distinction. Similarly, none of the two dialects distinguishes between the mid front vowels [e, ɛ]. However, all three dialects make the distinction between front mid and central mid vowels [e/ɛ, ə].

In fact, a true vowel inventory of Dagbani can be summarized as follows:

Short vowels   i, e, ə, a, ɔ, o, u

Long vowels   i:, e:, a:, o:, u:

The seven vowel system indicated here is quite unusual in the sense that it contains the schwa. The usual seven vowel system found in languages is [i, e, ɛ, a, ɔ, o, u]. It seems that an eighth vowel, namely the schwa, is being added in the Nanuni dialect and this may or may not spread to the other dialects. This fact must be recognized and pointed out to the language educator.

2.0 SOME LINGUISTIC PROBLEMS

2.1 The Question of Sound Representation in the Ghanaian Languages

Our experience thus far is that the majority of researchers and linguists who use phonetic data on Ghanaian languages are unable to determine the unique sound from the phonetic symbols used. This is because languages that are adjacent to one another often use similar phonetic symbols to indicate "different" sounds while using different symbols to indicate the "same" sounds. This inconsistency has made it difficult for researchers to conduct any meaningful comparisons within the Ghanaian languages as well as between Ghanaian languages and other (better known) languages of the world, especially those of European origin.

2.2 The Question of the Low Vowel in Ghanaian languages
Results of studies conducted on the vowel sounds of eight of the fifteen largest Ghanaian languages, namely, Akan, Ewe, GaDangme, Dagbani, Gurune, Nzema, Ahanta, and Larteh indicated that contrary to what has been written of the vowel sounds of the Ghanaian languages, hardly any of them uses a front low vowel. In fact, the majority have a low vowel that may be described as back (rather than central even). Table 2 presents a summary of the most popular vowel inventory in the top 15 Ghanaian languages.

Table 2. Summary of Ghanaian language vowel height versus front-back.

	Front	Central	Back
High:	[i]		[u]
Middle 1:	[e]		[o]
Middle 2:	[ɛ]		[ɔ]
Low:		[a]	

2.3 Orthography versus Speech Sounds of Ghanaian Languages
A look at some of the orthographic problems as far as the pronunciations of the vowels of some Ghanaian languages are concerned, reveals, regrettably, that since the European missionary educators left and the indigenes took over, there has been very little, if any, attempt to review the various orthographies of Ghana, using native speaker intuition. This oversight has posed many problems for Ghanaian school children.

2.3 Implications of these findings to the language teacher
A major concern of all language teachers is that they present the structure of the language(s) they teach as truthfully as possible. This means that an accurate description of the language must be made available to the language teacher at all levels of grammar including, the phonetic, phonological, morphological, syntactic, and semantic levels. Clearly, if the language data at the disposal of the teacher is suspect, the knowledge imparted will be suspect too. Nartey (1979) points out that assumptions made on such data should, at best, be taken with a grain of salt (p.1).

It is for the reasons cited here as well as other related reasons that the Phonetics Lab group of the Department of Applied Linguistics at the University of Education, Winneba, has embarked on an all out systematic research into the speech sounds of the Ghanaian languages. Results of these studies will be presented in the UEW PAL.

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